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APPLICATION NO. _	FILING DATE _	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/934,334	08/21/2001	Paul R. Berger	3531-0103P	8252

2292 7590 06/12/2003

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EXAMINER

KANG, DONGHEE

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 06/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/934,334

Applicant(s)

BERGER ET AL.

Examiner

Donghee Kang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 54-85 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 54-85 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. This application appears to be a division of Application No. 09/565,455, filed on May 5, 2000. A later application for a distinct or independent invention, carved out of a pending application and disclosing and claiming only subject matter disclosed in an earlier or parent application is known as a divisional application or "division." The divisional application should set forth only that portion of the earlier disclosure which is germane to the invention as claimed in the divisional application.

Claim Objections

2. Claim 57 is objected to because of the following informalities: the phrase "a second quantum well is formed adjacent to, but not necessarily in direct contact with, the bottom injector layer and the tunnel barrier" is misdescriptive. The bottom injector should be the top injector. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims **54-73 & 83-85** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims **54-57**, the phrase "a top injector adjacent to, but not necessary in direct contact with, the bottom injector" is unclear since no figure show the top injector

is in direct contact with the bottom injector. Examiner suggests deleting "but not necessary in direct contact with".

Regarding claim **56**, the phrase "a quantum well is formed adjacent to, but not necessarily in direct contact with, the bottom injector layer and the tunnel barrier" is unclear since figures show that a quantum well is formed in direct contact with the bottom injector layer but not the tunnel barrier.

Regarding claim **57**, the phrase "a first quantum well is formed adjacent to, but not necessarily in direct contact with, the bottom injector layer and the tunnel barrier" and "a second quantum well is formed adjacent to, but not necessarily in direct contact with, the top injector layer and the tunnel barrier" are unclear since figures show that a first and second quantum wells are formed in direct contact with the bottom and top injector layers but not the tunnel barrier.

Regarding claims **54 -57**, the phrase "the bottom injector and top injector layers forming a p-n junction" is unclear how to form the p-n junction between the bottom injector and top injector layers because the top injector is separated by an offset from the bottom injector.

Regarding claim **83**, the phrase "at reduced substrate temperature" is vague and indefinite since what is the reduced substrate temperature does not provided.

Claims 58-73 & 84-85 are rejected since each includes the limitations of independent claims 54-57 & 83.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims **74 & 83-85** are rejected under 35 U.S.C. 102(b) as being anticipated by Gennser et al. (J.Vac.Sci.Technol.b 8 (2), 1990, pp210).

Regarding claim **74**, Gennser et al. teach a method of fabricating a tunnel diode by heat treating, during growth of the layers in the tunnel diode (see part II. Experiment and discussion).

Regarding claims **83-85**, Gennser et al. teach a method of fabricating an tunnel diode by growing at least quantum well epitaxially at temperature 390 °C.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims **75-82** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gennser et al. (J.Vac.Sci.Technol.b 8 (2), 1990, pp210) in view of Larsen et al. (Appl.Phys.Lett. 68 (19), 1996).

Gennser et al. do not expressly teach heat treatment using an inert or reducing atmosphere or moreover a reduction in ambient gas pressure with various temperature

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and times. However, Larsen et al. teach heat treatment in a high flow furnace using an argon ambient with the temperature monitored as a function of time in order to obtain a precise temperature-time set. Temperature between 729 and 1028 °C were used for times between 20 min and 24 h. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select a proper temperature and time in order to obtain a high crystalline quality layers.

Additional Remarks

9. The lack of an art rejection for claims 54-73 with this Office Action is not an indication of allowance subject matter (i.e, even though the claims 54-73 are rewritten or amended to overcome the rejection under 35 U.S.C 112 as discussed above). The disclosure/claimed language is such that it is impractical to conduct a reasonable search of the prior art by the examiner.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Donghee Kang
Examiner
Art Unit 2811

dhk
June 9, 2003